3.3.2 Barrens Group

Information in Section 3.3.2 is taken from the WDNR Handbook "Ecological Landscapes of Wisconsin", and "Wisconsin's Biodiversity as a Management Issue" (Addis et al. 1995).

Barrens are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees, and scattered large trees. Curtis (1959) described these communities as pine barrens in northern and central Wisconsin and as oak barrens in southern and west-central Wisconsin. Because of their dynamic nature and the variability in structural types and species composition, they are difficult to describe and classify. Prior to Euro-American settlement, the vegetative structure of large barrens landscapes was quite variable and dynamic. Inclusions of variously sized and aged forest stands such as mature red pine, mature oak (bur, red, Hill's, or black), aspen groves, and numerous wetlands were typical of most pine and oak barrens.

The barrens are a tenuous group of communities pulled in opposing directions by disturbance and succession. In the absence of fire, barrens proceed through successional stages from savanna to closed-canopy forests. The open barrens condition is now the rarest of the potential successional stages, because fire suppression has allowed woody vegetation to take over in most barrens communities.

Historically, Wisconsin's most extensive barrens were in large areas of sandy glacial deposits, including outwash plains, lakebeds, and outwash terraces along rivers. Geographically, areas of extensive barrens were concentrated in the Northeast Sands, Northern Highlands, Northwest Sands, and Central Sands Ecological Landscapes. They were also found on outwash terraces along the Lower Wisconsin, Lower Chippewa and Mississippi Rivers.

One consistent element of all barrens is their dependence on fire and the major role that fire plays in their dynamics. Fires have burned on Wisconsin barrens for thousands of years. Prior to Euro-American settlement, some fires were caused by lightning. Others were set by Native Americans to maintain game habitat, drive game, and enhance fruit and berry crops. Historically, behavior of fire was greatly influenced by topography and soil factors. Natural wildfires usually produce a complex mosaic of burned and unburned patches depending on fire intensity, topography, soil moisture, and local weather.

In pine barrens, the most common tree is jack pine, but red pine may also be present. Hill's oak and bur oak may be present as scrubs or as a scattering of larger trees. The understory is composed of grasses, sedges, and forbs, many of them associated with dry prairies. Plants of the heath family, such as blueberries and bearberry, and shrubs such as prairie willow, hazelnut, and redroot, are often prominent members of the barrens flora. Pine barrens distribution is mostly north of the Tension Zone, and in parts of the Central Sands.

Oak barrens support black oak or Hill's oak as their most prominent tree. Jack pine is absent or in low abundance, and the understory consists of plants associated with dry sandy prairies. The oak barrens community occurs primarily south of the Tension Zone, and also in parts of the Northwest Sands.

Both pine and oak barrens are rare and imperiled globally. In North America, pine barrens exist primarily in the Midwest and along the east coast. Wisconsin has one of the best opportunities in North America for preserving and restoring this community. Significant opportunities for oak barrens protection and restoration also exist in Wisconsin, but most of these are at a relatively small scale of several hundred acres or less.

During the development of the Wisconsin Strategy for Wildlife Species of Greatest Conservation Need, three community types were identified for inclusion within the Barrens Group. These communities are listed below.

- Great Lakes barrens (Section 3.3.2.1, Page 3-451)
- Oak barrens (Section 3.3.2.2, Page 3-457)
- Pine barrens (Section 3.3.2.3, Page 3-466)

Summary of Vertebrate Species of Greatest Conservation Need Associated with Barrens Communities

23 Birds
11 Herptiles
9 Mammals

43 Total Species

The vertebrate Species of Greatest Conservation Need in each of these barren communities are presented in the following sections, along with information on opportunities, threats, and priority conservation actions.

3.3.2.1 Great Lakes Barrens

3.3.2.1.1 Community Overview

This globally rare community type is a variant of the pine barrens community and is known primarily from sandspits in the Apostle Islands. It was historically of limited extent, and occurred on sandspits and dunes along the Great Lakes shorelines. The very small number of occurrences makes it difficult to characterize the type with confidence. Lake Superior occurrences are almost entirely lacking in the representation of prairie species. Instead, the groundlayer is composed mostly of lichens, fungi, grasses, sedges, ericaceous shrubs and sub-shrubs, and a limited number of flowering herbs. The dominant trees in the more open stands are pines, especially red pine, which are widely scattered, and demonstrate the limb architecture that develops under open-grown conditions, as well as wind and fire deformities. Eastern white pine may be present, and jack pine is now dominant in a few areas that have high restoration potential. The understory consists of dense carpets of lichens, scattered thickets of common juniper, patches of early blueberry, huckleberry, and sand cherry. Other common plants include crinkled hairgrass, ticklegrass, false-heather, sand cress, and bearberry.

The extremely xeric site conditions and periodic past wildfires have maintained this community over time. Fire scars on living pines and snags from Stockton Island in the Apostles Archipelago revealed highly variable fire frequencies, ranging from multiple fires within a five year period to the passage of decades with no evidence of fire whatsoever (E. Epstein, personal observation 1988). Associated natural communities include Great Lakes beach, Great Lakes dune, interdunal wetland, and northern dry forest.

3.3.2.1.2 Vertebrate Species of Greatest Conservation Need Associated with Great Lakes Barrens

Three vertebrate Species of Greatest Conservation Need were identified as moderately or significantly associated with Great Lakes barrens (Table 3-69).

Table 3-69. Vertebrate Species of Greatest Conservation Need that are (or historically were) moderately or significantly associated with Great Lakes barrens communities.

Species Significantly Associated with Great Lakes Barrens
Herptiles
Wood Turtle
Blanding's Turtle
Species Moderately Associated with Great Lakes Barrens
Mammals
Northern Flying Squirrel

In order to provide a framework for decision-makers to set priorities for conservation actions, the species identified in Table 3-69 were subject to further analysis. The additional analysis identified the best opportunities, by Ecological Landscape, for protection, restoration, and/or management of both Great Lakes barrens and associated vertebrate Species of Greatest Conservation Need. The steps of this analysis were:

- Each species was examined relative to its probability of occurrence in each of the 16 Ecological Landscapes in Wisconsin. This information was then cross-referenced with the opportunity for protection, restoration, and/or management of Great Lakes barrens in each of the Ecological Landscapes (Tables 3-70 and 3-71).

- Using the analysis described above, a species was further selected if it had both a significant association with Great Lakes barrens and a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of Great Lakes barrens. These species are shown in Figure 3-9.

Table 3-70. Vertebrate Species of Greatest Conservation Need that are (or historically were) *significantly* associated with Great Lakes barrens communities and their association with Ecological Landscapes that support Great Lakes barrens.

Great Lakes Barrens

Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type	Herptiles (2)*	
	Wood Turtle	Blanding's Turtle
MAJOR		
Superior Coastal Plain		
PRESENT (MINOR)		
Northern Lake Michigan Coastal		

*** The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.**

Color Key

- = **HIGH probability the species occurs in this Ecological Landscape**
- = **MODERATE probability the species occurs in this Ecological Landscape**
- = **LOW or NO probability the species occurs in this Ecological Landscape**

Table 3-71. Vertebrate Species of Greatest Conservation Need that are (or historically were) *moderately* associated with Great Lakes barrens communities and their association with Ecological Landscapes that support Great Lakes barrens.

Great Lakes Barrens Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type	Northern Flying Squirrel Mammals (1)*
MAJOR	
Superior Coastal Plain	
PRESENT (MINOR)	
Northern Lake Michigan Coastal	

Color Key

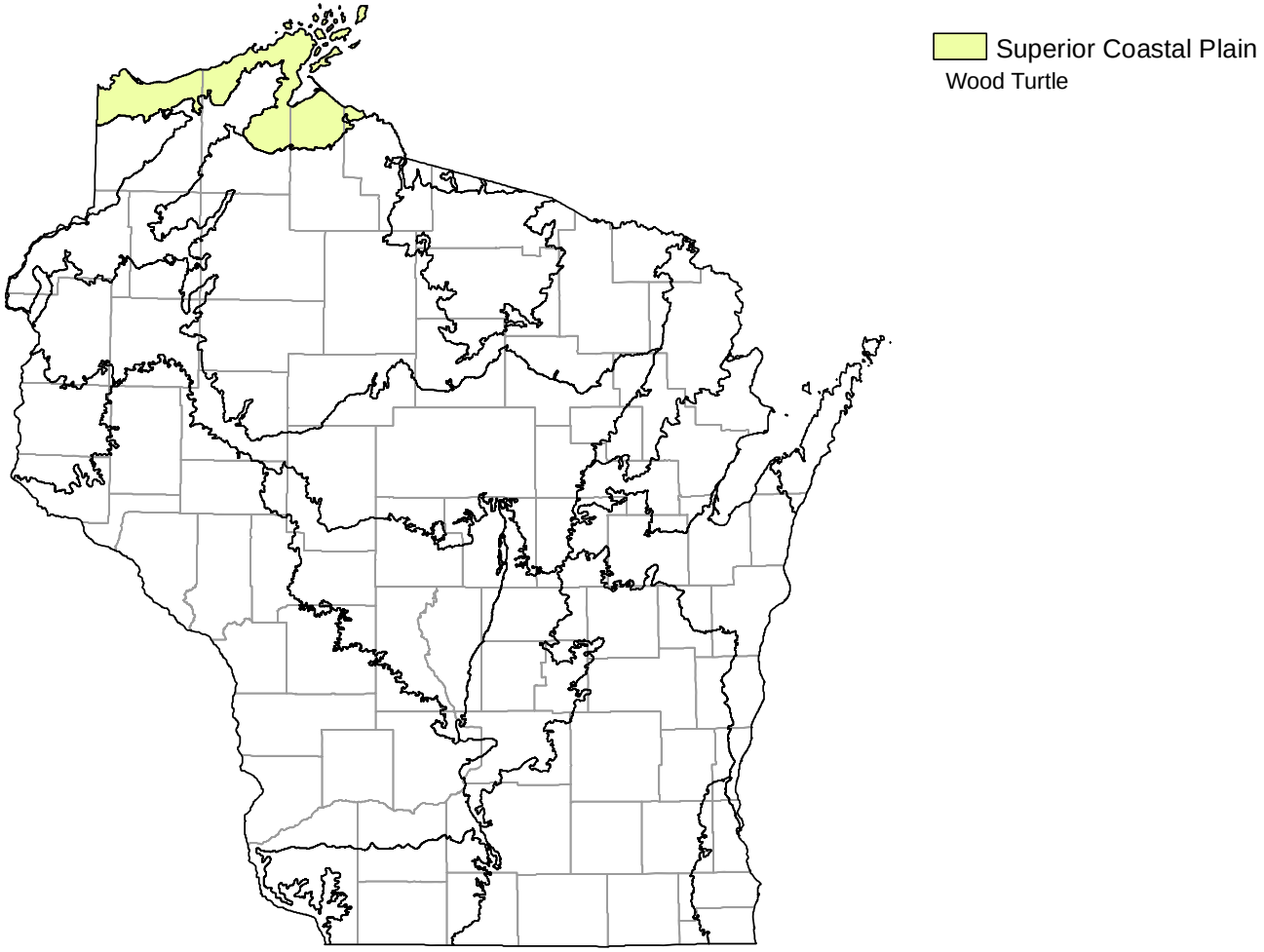
= HIGH probability the species occurs in this Ecological Landscape

= MODERATE probability the species occurs in this Ecological Landscape

= LOW or NO probability the species occurs in this Ecological Landscape

*** The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.**

Figure 3-9. Vertebrate Species of Greatest Conservation Need that have ***both* a significant association with Great Lakes barrens ***and*** a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of Great Lakes barrens.**



3.3.2.1.3 Threats and Priority Conservation Actions for Great Lakes Barrens

3.3.2.1.3.1 Statewide Overview of Threats and Priority Conservation Actions for Great Lakes Barrens

The following list of threats and priority conservation actions were identified for Great Lakes barrens in Wisconsin. The threats and priority conservation actions described below apply to all of the Ecological Landscapes in Section 3.3.2.1.3.2 unless otherwise indicated.

Threats and Issues

- The few remaining sites are small and isolated.
- The sandy substrate, sparse vegetation, and slow recovery time makes this community fragile. It will not stand up to heavy foot traffic, and vehicle traffic will cause lasting damage.
- Occurrences require meaningful protection from inappropriate uses if damage to the soils and flora is to be avoided.
- Several sandspit sites that historically supported open or savanna-like barrens vegetation with scattered trees have now succeeded to dense forests due to the lack of fire disturbance. These areas are now dominated by either jack pine; combinations of pines, common juniper, deciduous shrubs, and thickets of small balsam fir; or stands of northern pin oak.
- Invasive plants are currently not a large problem, but spotted knapweed and leafy spurge are potential threats for this type.

Priority Conservation Actions

- Known occurrences should be monitored closely for signs of overuse and the presence of invasive plants.
- Additional research is needed to clarify the fire history of the barrens on sandspits and develop plans for appropriate prescribed burn regimes.
- Restoration may be an option at a few sites within the Apostle Islands National Lakeshore, and should be investigated further.
- Non-vascular plants and invertebrates should be characterized prior to initiating a broadscale prescribed burning plan.
- Burn units should be designed with great care due to the limited amount of this type now available and the potential presence of fire-sensitive invertebrates.

3.3.2.1.3.2 Additional Considerations for Great Lakes Barrens by Ecological Landscape

Special considerations have been identified for those Ecological Landscapes where major or important opportunities for protection, restoration, and/or management of the Great Lakes barrens exist. Those considerations are described below and are in addition to the statewide threats and priority conservation actions for Great Lakes barrens found in Section 3.3.2.1.3.1.

Additional Considerations for Great Lakes Barrens in Ecological Landscapes with ***Major*** Opportunities for Protection, Restoration, and/or Management

Superior Coastal Plain

The best opportunities to protect and manage this type are associated with sandscapes in the Apostle Islands. Stockton Island has the largest, least disturbed example, but there is management and/or restoration potential on several of the other islands.

Additional Considerations for Great Lakes Barrens in Ecological Landscapes with ***Important*** Opportunities for Protection, Restoration, and/or Management

Northern Lake Michigan Coastal

Protection and management opportunities away from Lake Superior are apparently extremely limited, but a few remnants have been identified in this Ecological Landscape. These sites are privately owned, and all are extremely small, with the largest known barrens remnant only a few acres in size. In contrast to the occurrences on Lake Superior, at least one of the sites on Lake Michigan supports a flora composed mostly of prairie species. Additional survey work to identify or better describe remnants should include the Green Bay Islands with sandy soils (e.g., Chambers Island), and also consider some of the sandy regions in the vicinity of the towns of Peshtigo and Marinette.

3.3.2.2 Oak Barrens

3.3.2.2.1 Community Overview

Black oak is often the dominant tree in this fire-adapted savanna community of xeric sites, but white oak, bur oak, northern pin oak, and occasionally red oak, may also be present. Common understory species include lead plant, black-eyed susan, round-headed bush-clover, goats rue, june grass, little bluestem, flowering spurge, frostweed, false Solomon's-seal, spiderwort, and wild lupine. Some of the oak barrens remnants also contain patches of heath-like vegetation in addition to the prairie understory, with bracken fern, blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), bearberry, and sweet fern locally common or even dominant. Distribution of this community is mostly in southwestern, central and west central Wisconsin.

The pine barrens and oak barrens communities described by Curtis (1959) share many similarities. In general, prairie species are better represented in the more oak-dominated barrens to the south, and pines and some of their characteristic associates are more prominent in the north. However, jack pine is an important component of some of Wisconsin's southernmost barrens occurrences (e.g., Gotham Jack Pines on the Wisconsin River in Richland County), and both red pine savanna and jack pine barrens were described in the Public Land Survey notes for Juneau County. Frequent fires can reduce the oaks to short, multi-stemmed "grubs", and result in the elimination of scattered large oaks that were formerly important in and characteristic of some areas.

Barrens communities occur on several landforms, especially outwash plains, lakeplains, and on the broad sandy terraces that flank some of the major rivers of southern Wisconsin. Soils are usually excessively well-drained sands, though thin-soiled, droughty sites over bedrock can also support this community. Similar communities include pine barrens, oak openings (drier sites), sand prairie, southern dry forest, Central Sands pine - oak forest, and bedrock glade.

3.3.2.2.2 Vertebrate Species of Greatest Conservation Need Associated with Oak Barrens

Twenty-eight vertebrate Species of Greatest Conservation Need were identified as moderately or significantly associated with oak barrens (Table 3-72).

Table 3-72. Vertebrate Species of Greatest Conservation Need that are (or historically were) moderately or significantly associated with oak barrens communities.

Species Significantly Associated with Oak Barrens
Birds
Sharp-tailed Grouse
Brown Thrasher
Vesper Sparrow
Lark Sparrow
Herptiles
Wood Turtle
Blanding's Turtle
Western Slender Glass Lizard
Northern Prairie Skink
Prairie Racerunner
Bullsnake
Eastern Massasauga Rattlesnake
Mammals
Franklin's Ground Squirrel
Species Moderately Associated with Oak Barrens
Birds
Northern Harrier
Upland Sandpiper
Black-billed Cuckoo
Whip-poor-will
Red-headed Woodpecker
Loggerhead Shrike
Field Sparrow
Grasshopper Sparrow
Western Meadowlark
Herptiles
Yellow-bellied Racer
Prairie Ringneck Snake
Western Ribbon Snake
Mammals
Northern Long-eared Bat
Eastern Red Bat
Prairie Vole
Gray Wolf

In order to provide a framework for decision-makers to set priorities for conservation actions, the species identified in Table 3-72 were subject to further analysis. The additional analysis identified the best opportunities, by Ecological Landscape, for protection, restoration, and/or management of both oak barrens and associated vertebrate Species of Greatest Conservation Need. The steps of this analysis were:

- Each species was examined relative to its probability of occurrence in each of the 16 Ecological Landscapes in Wisconsin. This information was then cross-referenced with the opportunity for protection, restoration, and/or management of oak barrens in each of the Ecological Landscapes (Tables 3-73 and 3-74).

- Using the analysis described above, a species was further selected if it had both a significant association with oak barrens and a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of oak barrens. These species are shown in Figure 3-10.

Table 3-73. Vertebrate Species of Greatest Conservation Need that are (or historically were) *significantly* associated with oak barrens communities and their association with Ecological Landscapes that support oak barrens.

Oak Barrens	Birds (4)*				Herptiles (7)							Mammals (1)
Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type	Sharp-tailed Grouse	Brown Thrasher	Vesper Sparrow	Lark Sparrow	Wood Turtle	Blanding's Turtle	Western Slender Glass Lizard	Northern Prairie Skink	Prairie Racerunner	Bullsnake	Eastern Massasauga Rattlesnake	Franklin's Ground Squirrel
MAJOR												
Central Sand Plains												
Western Coulee and Ridges												
IMPORTANT												
Central Sand Hills												

Color Key

- = **HIGH probability the species occurs in this Ecological Landscape**
- = **MODERATE probability the species occurs in this Ecological Landscape**
- = **LOW or NO probability the species occurs in this Ecological Landscape**

*** The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.**

Table 3-74. Vertebrate Species of Greatest Conservation Need that are (or historically were) *moderately* associated with oak barrens communities and their association with Ecological Landscapes that support oak barrens.

Oak Barrens	Birds (9)*									Herptiles (3)			Mammals (4)			
Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type	Northern Harrier	Upland Sandpiper	Black-billed Cuckoo	Whip-poor-will	Red-headed Woodpecker	Loggerhead Shrike	Field Sparrow	Grasshopper Sparrow	Western Meadowlark	Yellow-bellied Racer	Prairie Ringneck Snake	Western Ribbon Snake	Northern Long-eared Bat	Eastern Red Bat	Prairie Vole	Gray Wolf
MAJOR																
Central Sand Plains																
Western Coulee and Ridges																
IMPORTANT																
Central Sand Hills																

Color Key

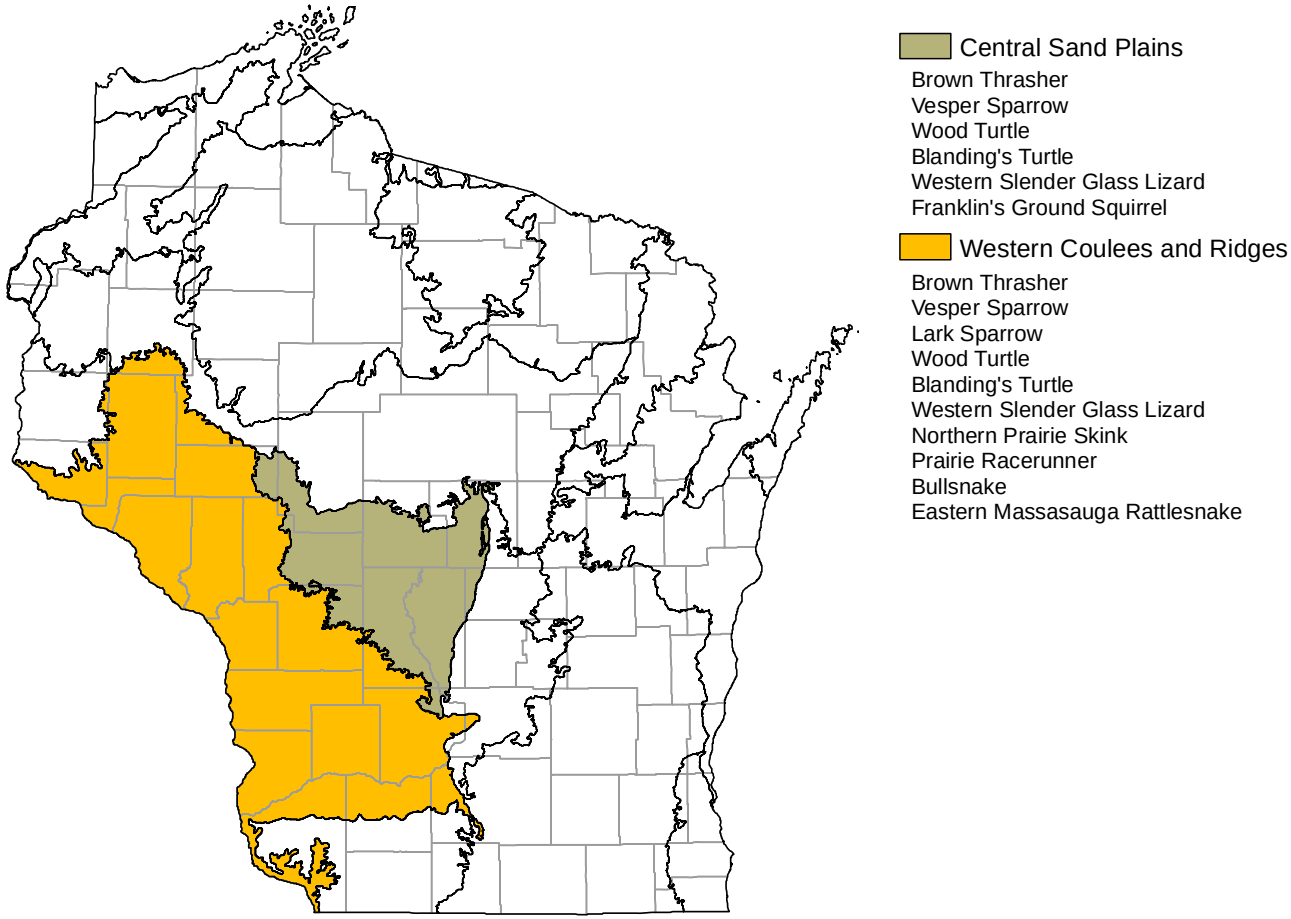
= **HIGH probability the species occurs in this Ecological Landscape**

= **MODERATE probability the species occurs in this Ecological Landscape**

= **LOW or NO probability the species occurs in this Ecological Landscape**

*** The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.**

Figure 3-10. Vertebrate Species of Greatest Conservation Need that have ***both* a significant association with oak barrens ***and*** a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of oak barrens.**



3.3.2.2.3 Threats and Priority Conservation Actions for Oak Barrens

3.3.2.2.3.1 Statewide Overview of Threats and Priority Conservation Actions for Oak Barrens

The following list of threats and priority conservation actions were identified for oak barrens in Wisconsin. The threats and priority conservation actions described below apply to all of the Ecological Landscapes in Section 3.3.2.2.3.2 unless otherwise indicated.

Threats and Issues

- Some existing sites are small, overgrown with woody vegetation, and isolated. Small patch size may be a problem for some species; research is needed on the appropriate range of sizes needed to maintain all barrens species.
- Current composition and structure does not reflect the wide range of natural variability of this type.
- Lack of fire allows conversion to forest; too much burning may result in simplification and the elimination of some species.
- Invasive plants such as spotted knapweed and exotic spurges are an existing serious threat.
- Grazing by cattle and high deer densities can diminish or eliminate understory plants.
- Rural housing and exurban development fragments restorable stands, and makes the use of prescribed fire problematic.
- Conversion to pine plantations is a significant threat in some places. This trend may be exacerbated by objectives for removing oak stands of low economic value that are potentially threatened by gypsy moth outbreaks. Conflicts sometimes exist with forest or grassland objectives.
- Some areas that likely contain restorable sites have not been adequately inventoried (e.g. along the lower Black River).
- More information is needed to learn how to manage for the full range of natural variability associated with this community type.
- "Savannas", characterized by widely scattered large trees, are under-represented in our managed barrens.
- ATV's and other motorized vehicles can damage fragile soils, lead to erosion, and facilitate the spread of invasive plants. They can also directly damage or destroy sensitive vegetation.
- Dense sods of Pennsylvania sedge dominate the groundlayers of many former barrens sites from which fire has been excluded, and plant diversity in such sites is currently very low.

Priority Conservation Actions

- This complex of community types is globally rare. Long-term conservation will depend on a combination of protection and restoration, and Wisconsin has some of the best management opportunities in North America.
- Research on restoration techniques and their effectiveness is needed, and should be applied at appropriate sites.
- Identify additional locations where restorable sites exist. Limit additional development on and around restorable sites to increase management options.
- Active management is required to maintain the type. Develop a practical "toolkit" for maintaining the structure and composition characteristic of barrens ecosystems.
- Encourage use of prescribed fire to maintain this community, along with mechanical brushing and compatible forestry practices. Develop educational tools and demonstration areas that promote benefits of prescribed fire, and address the public's liability concerns. Follow existing WDNR screening guidance to minimize impacts on sensitive species.

- Where possible, manage this type in complexes with pine barrens, sand prairie, southern dry forest, bedrock glade, and surrogate grasslands to achieve economies of scale and better ensure that all phases of the community and its associated species are maintained over time. Use surrogate habitat following logging to buffer barrens openings, allow for species dispersal, and connect existing habitat. Manage this type as a moving mosaic of habitat, ensuring that habitat for the many species that require open conditions is not diminished or degraded.
- Reduce deer density.
- Restrict ATV use in sensitive areas.
- Continue and support research to find biocontrols for invasives. Control the spread of new invasives and attempt to identify populations of invasives when they are small and eliminate them.

3.3.2.2.3.2 Additional Considerations for Oak Barrens by Ecological Landscape

Special considerations have been identified for those Ecological Landscapes where major or important opportunities for protection, restoration, and/or management of oak barrens exist. Those considerations are described below and are in addition to the statewide threats and priority conservation actions for oak barrens found in Section 3.3.2.2.3.1.

Additional Considerations for Oak Barrens in Ecological Landscapes with ***Major*** Opportunities for Protection, Restoration, and/or Management

Central Sand Plains

The large public land base in the Central Sand Plains Ecological Landscape can be used to accomplish barrens restoration and management objectives. Opportunities to develop partnerships with private groups should be explored and fostered. Restoration and management efforts are underway at Necedah National Wildlife Refuge (Juneau County), Bauer-Brockway Barrens (Jackson County Forest), Quincy Bluff and Wetlands State Natural Area (Adams County), and Sandhill State Wildlife Area (Wood County). There are legitimate restoration opportunities on the Black River State Forest (Jackson County).

Western Coulees and Ridges

Excellent examples of oak barrens occur at Fort McCoy Military Reservation (Monroe County). There are some distinctive and important occurrences of barrens (that include jack pine) on the broad terraces bordering some of the major rivers in the Ecological Landscape, e.g., North Bend Bottoms State Wildlife Area (Jackson County), Trempealeau National Wildlife Refuge (Trempealeau County), and Nine Mile Island Savanna (Pepin County). Additional survey work is warranted on some of the major river terraces, especially the Black.

Additional Considerations for Oak Barrens in Ecological Landscapes with ***Important*** Opportunities for Protection, Restoration, and/or Management

Central Sand Hills

Oak barrens are not well represented in this Ecological Landscape, but there are good opportunities for restoration at small to medium scales. Opportunities occur at Rocky Run

Savanna State Natural Area (Columbia County) Lawrence Creek State Natural Area (Adams and Marquette Counties), and Emmons Creek State Fishery Area (Portage County).

3.3.2.3 Pine Barrens

3.3.2.3.1 Community Overview

This savanna community is typically characterized by scattered jack pines, or less commonly, red pines, sometimes mixed with scrubby Hill's and bur oaks. The scattered trees or groves are interspersed with openings in which shrubs such as hazelnuts (*Corylus americana* and *C. cornuta*) sand cherry, and prairie willow are prominent, along with prairie grasses and forbs. The groundlayer often contains species characteristic of "heaths", such as blueberries (*Vaccinium angustifolium* and *V. myrtilloides*), bearberry, and sweet fern. Other characteristic plants include dry sand prairie species such as june grass, little bluestem, silky and azure asters (*Aster sericeus* and *A. oolentangiensis*), lupine, blazing-stars (*Liatris aspera* and *L. cylindracea*), and western sunflower. Pines may now be infrequent, even absent, in some stands in northern Wisconsin and elsewhere because of past logging, altered fire regimes, and an absence of seed source. In extreme cases, the pines have been virtually eliminated and oak sprouts and shrubs are now the dominant woody species.

The pine and oak barrens communities described by Curtis (1959) share many similarities. In general, there is a loss in the number and abundance of prairie species from south to north, and pine was more characteristic of the northern stands. However, jack pine is an important component of some of Wisconsin's southernmost barrens occurrences (e.g., Gotham Jack Pines on the Wisconsin River in Richland County), and both red pine savanna and jack pine barrens were described in the Public Land Survey notes for Juneau County in central Wisconsin. Maintaining pine in some of the managed stands has been challenging for managers. Frequent fires can cause the local elimination of species like the pines that don't have the ability to send up root sprouts. Also, in some parts of Wisconsin, jack pine does not have serotinal cones, which open under the intense heat generated by wildfire, and can then reseed burned areas in which the adult pines have been killed.

The pine barrens community occurs on landforms that include outwash plains, glacial lakeplains, and broad sandy terraces that flank some of the major rivers of southern Wisconsin. Soils are almost always dry and sandy, of low nutrient status, and in topography that is often nearly level, but can be gently rolling. Similar communities include oak barrens, bracken grassland, sand prairie, northern dry forest, Central Sands pine - oak forest, and bedrock glade.

3.3.2.3.2 Vertebrate Species of Greatest Conservation Need Associated with Pine Barrens

Twenty-eight vertebrate Species of Greatest Conservation Need were identified as moderately or significantly associated with pine barrens (Table 3-75).

Table 3-75. Vertebrate Species of Greatest Conservation Need that are (or historically were) moderately or significantly associated with pine barrens communities.

Species Significantly Associated with Pine Barrens
Birds
Sharp-Tailed Grouse
Brown Thrasher
Kirtland's Warbler
Vesper Sparrow
Herptiles
Boreal Chorus Frog
Wood Turtle
Blanding's Turtle
Western Slender Glass Lizard
Northern Prairie Skink
Bullsnake
Eastern Massasauga Rattlesnake
Mammals
Franklin's Ground Squirrel
Species Moderately Associated with Pine Barrens
Birds
Northern Harrier
Upland Sandpiper
Black-billed Cuckoo
Whip-poor-will
Connecticut Warbler
Field Sparrow
Lark Sparrow
Red Crossbill
Herptiles
Yellow-bellied Racer
Mammals
Gray Wolf

In order to provide a framework for decision-makers to set priorities for conservation actions, the species identified in Table 3-75 were subject to further analysis. The additional analysis identified the best opportunities, by Ecological Landscape, for protection, restoration, and/or management of both pine barrens and associated vertebrate Species of Greatest Conservation Need. The steps of this analysis were:

- Each species was examined relative to its probability of occurrence in each of the 16 Ecological Landscapes in Wisconsin. This information was then cross-referenced with the opportunity for protection, restoration, and/or management of pine barrens in each of the Ecological Landscapes (Tables 3-76 and 3-77).

- Using the analysis described above, a species was further selected if it had both a significant association with pine barrens and a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of pine barrens. These species are shown in Figure 3-11.

Table 3-76. Vertebrate Species of Greatest Conservation Need that are (or historically were) *significantly* associated with pine barrens communities and their association with Ecological Landscapes that support pine barrens.

Pine Barrens	Birds (4)*				Herptiles (7)							Mammals (1)
Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type	Sharp-tailed Grouse	Brown Thrasher	Kirtland's Warbler	Vesper Sparrow	Boreal Chorus Frog	Wood Turtle	Blanding's Turtle	Western Slender Glass Lizard	Northern Prairie Skink	Bullsnake	Eastern Massasauga Rattlesnake	Franklin's Ground Squirrel
MAJOR												
Central Sand Plains	M	H		H		H	H	H		M	M	H
Northeast Sands	M	H		H		H	M					
Northwest Sands	H	H		H	H	H	H		H	H		H
IMPORTANT												
Central Sand Hills		H		H			H	H		M		H
Western Coulee and Ridges		H		H		H	H	H	H	H	H	M
PRESENT (MINOR)												
Northern Highland		H		H		H						

Color Key

H = HIGH probability the species occurs in this Ecological Landscape

M = MODERATE probability the species occurs in this Ecological Landscape

= LOW or NO probability the species occurs in this Ecological Landscape

*** The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.**

Table 3-77. Vertebrate Species of Greatest Conservation Need that are (or historically were) *moderately* associated with pine barrens communities and their association with Ecological Landscapes that support pine barrens.

Pine Barrens	Birds (8)*								Herptiles (1)	Mammals (1)
Ecological Landscape grouped by opportunity for management, protection, and/or restoration of this community type	Northern Harrier	Upland Sandpiper	Black-billed Cuckoo	Whip-poor-will	Connecticut Warbler	Field Sparrow	Lark Sparrow	Red Crossbill	Yellow-bellied Racer	Gray Wolf
MAJOR										
Central Sand Plains	■	■	■	■	■	■	■	■	■	■
Northeast Sands	■	■	■	■		■	■	■		■
Northwest Sands	■	■	■	■	■	■		■		■
IMPORTANT										
Central Sand Hills	■	■	■	■		■	■	■	■	■
Western Coulee and Ridges	■	■	■	■		■	■		■	
PRESENT (MINOR)										
Northern Highland	■			■	■	■		■		■

Color Key

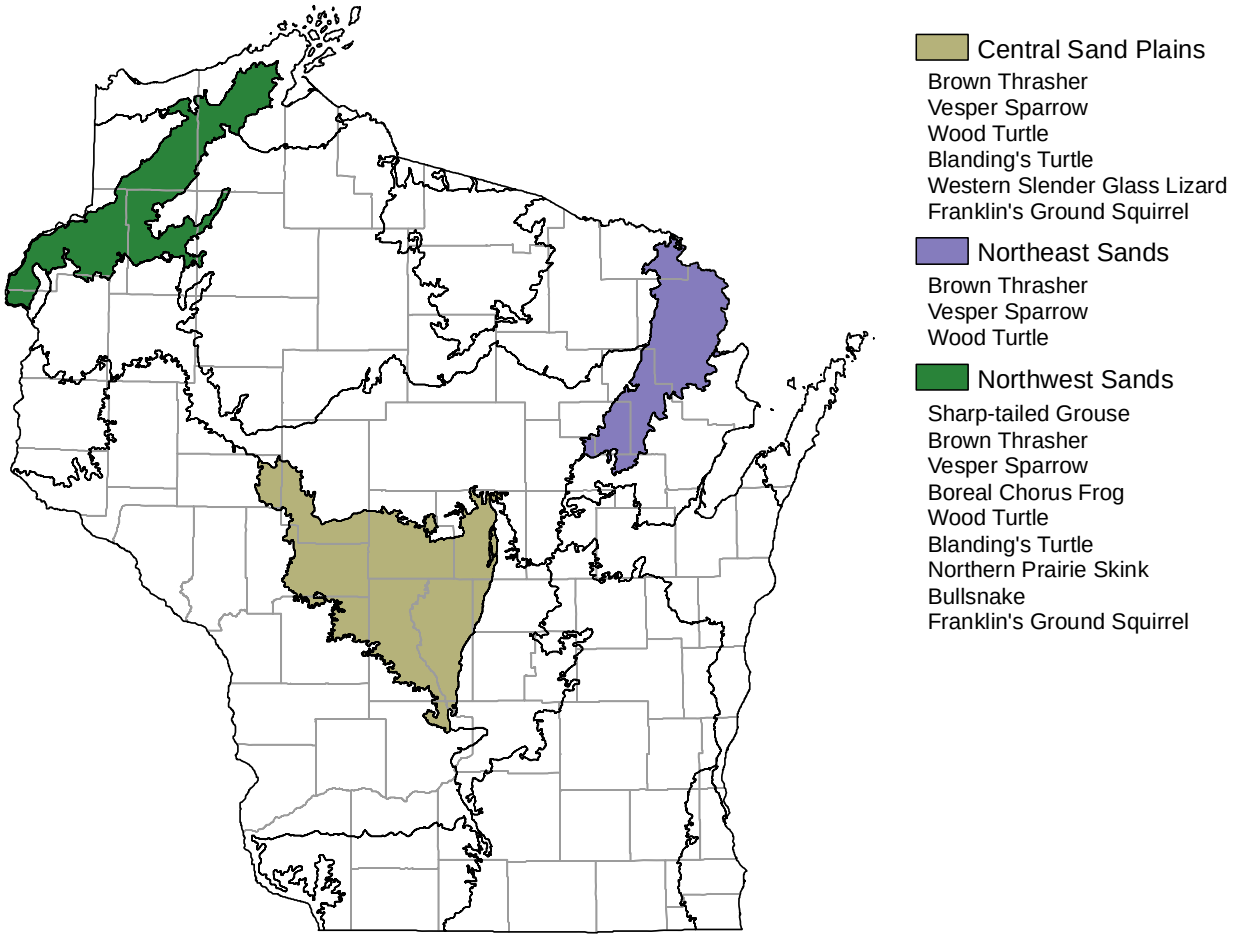
■ = **HIGH probability the species occurs in this Ecological Landscape**

■ = **MODERATE probability the species occurs in this Ecological Landscape**

□ = **LOW or NO probability the species occurs in this Ecological Landscape**

*** The number shown in parentheses is the number of Species of Greatest Conservation Need from a particular taxa group that are included in the table. Taxa groups that are not shown did not have any Species of Greatest Conservation Need that met the criteria necessary for inclusion in this table.**

Figure 3-11. Vertebrate Species of Greatest Conservation Need that have ***both* a significant association with pine barrens ***and*** a high probability of occurring in an Ecological Landscape(s) that represents a major opportunity for protection, restoration and/or management of pine barrens.**



3.3.2.3.3 Threats and Priority Conservation Actions for Pine Barrens

3.3.2.3.3.1 Statewide Overview of Threats and Priority Conservation Actions for Pine Barrens

The following list of threats and priority conservation actions were identified for pine barrens in Wisconsin. The threats and priority conservation actions described below apply to all of the Ecological Landscapes in Section 3.3.2.3.3.2 unless otherwise indicated.

Threats and Issues

- Some existing sites are small, overgrown with woody vegetation, and isolated. Small patch size may be a problem for some species; research is needed on the appropriate range of sizes needed to maintain all barrens species.
- Current composition and structure does not reflect the wide range of natural variability of this type, which includes pine savanna, or a patchy distribution of barrens intermingled with otheropen lands which gradually transition into forests.
- Lack of fire allows conversion to forest; too much burning may result in simplification and the elimination of some species (e.g., pines).
- Invasive plants such as spotted knapweed and exotic spurges are an existing serious threat.
- Grazing by cattle and high deer densities can diminish or eliminate understory plants.
- Rural housing and exurban development fragments restorable stands and makes the use of prescribed fire problematic.
- Conversion to pine plantations is a significant threat in some places. Conflicts sometimes exist with forest or grassland objectives.
- Dense pine plantations can eliminate ground layer plants and produce ideal conditions for episodic jack pine budworm outbreaks.
- There is a need for additional inventory data on restorable sites.
- More information is needed to learn how to manage for the full range of natural variability associated with this community type.
- "Savannas", characterized by widely scattered large trees, are under-represented in our managed barrens.
- ATV's and other motorized vehicles can damage fragile habitat.
- Dense sods of Pennsylvania sedge dominate the groundlayers of many former barrens sites from which fire has been excluded, and plant diversity in such sites is currently very low.

Priority Conservation Actions

- This complex of community types is globally rare. Conservation will depend largely on restoration, and Wisconsin has some of the best opportunities in North America.
- Research on restoration techniques is needed, and should be applied where appropriate.
- Identify locations where restorable sites exist. Limit additional development on and around restorable sites to maintain management options.
- Active management is required to maintain the type. Manage in the context of dry forest and savanna in a gradient from forest to native or surrogate grassland. Use surrogate habitat following logging to buffer barrens openings, allow for species dispersal, and connect existing habitat. Manage this type as a moving mosaic of habitat.
- Encourage use of prescribed fire to maintain this community complex. Develop educational tools and demonstration areas that promote the benefits of prescribed fire, and address liability concerns. Mechanical brushing and some forestry practices are compatible with maintaining this type, especially where the use of fire is difficult or impossible. Follow existing WDNR screening guidance to minimize impacts on sensitive species.

- Develop a practical "toolkit" for maintaining the structure and composition characteristic of barrens ecosystems.
- Reduce deer density.
- Restrict ATV use in sensitive areas.
- Continue and support research to find biocontrols for invasives; control the spread of new invasives.

3.3.2.3.3.2 Additional Considerations for Pine Barrens by Ecological Landscape

Special considerations have been identified for those Ecological Landscapes where major or important opportunities for protection, restoration, and/or management of the pine barrens exist. Those considerations are described below and are in addition to the statewide threats and priority conservation actions for pine barrens found in Section 3.3.2.3.3.1.

Additional Considerations for Pine Barrens in Ecological Landscapes with ***Major*** Opportunities for Protection, Restoration, and/or Management

Central Sand Plains

The large public land base in the Central Sand Plains Ecological Landscape can be used to accomplish barrens restoration and management objectives. Opportunities to develop partnerships with private groups should be explored and fostered. Restoration and management efforts are underway at Necedah National Wildlife Refuge (Juneau County), Bauer-Brockway Barrens (Jackson County Forest), Quincy Bluff and Wetlands State Natural Area (Adams County), and Sandhill State Wildlife Area (Wood County). There are legitimate restoration opportunities on the Black River State Forest (Jackson County).

Northeast Sands

Many sites in this Ecological Landscape are similar to bracken grasslands, though they do contain prairie elements. Spread Eagle Barrens State Natural Area (Florence County), Athelstane Barrens (Marinette County), and Dunbar Barrens (Marinette County) contain examples of this type.

Northwest Sands

The globally rare pine barrens community is better represented in the Northwest Sands than in any other Ecological Landscape, and offers the best opportunities in the State for managing this type. This type should be managed in large habitat blocks where possible. Restoration efforts now include projects on county, state, and federal lands in Polk, Burnett, Douglas, and Bayfield counties. An important issue is connecting these scattered openings, at least periodically, to reduce the negative impacts of population isolation. The extensive areas of public land may make it possible to connect existing critical protected areas by using semi-natural landscapes (e.g., a combination of managed forests and abandoned farms) as connection corridors. Managing many thousands of acres in a mosaic of barrens, grasslands, wetlands and forests may be the best way to protect some species. Providing for the periodic movement of barrens-dependent species between some of the now-isolated patches is a key long-term management consideration, and could benefit many rare birds, herptiles, plants, butterflies, moths, and other invertebrates occurring in this Ecological Landscape. Opportunities to develop partnerships with private groups, including industrial forest landowners should be sought. Examples of this community are present at Crex Meadows State Wildlife Area (Burnett County), Namekagon Barrens (Burnett County), Solon

Springs Sharptail Barrens State Natural Area (Douglas County), Motts Ravine on the Brule River State Forest (Douglas County),and Moquah Barrens (Bayfield County).

Additional Considerations for Pine Barrens in Ecological Landscapes with ***Important*** Opportunities for Protection, Restoration, and/or Management

Central Sand Hills

Pine barrens are not well represented in this Ecological Landscape, but there are good opportunities for restoration at small to medium scales. Opportunities occur at Rocky Run Savanna State Natural Area (Columbia County) and Emmons Creek State Fishery Area (Portage County).

Western Coulees and Ridges

Excellent examples of oak barrens occur on Fort McCoy Military Reservation (Monroe County), including a pine component in some stands. There are some distinctive and important occurrences of barrens (that include jack pine) on the broad terraces bordering some of the major rivers in the Ecological Landscape, e.g., North Bend Bottoms State Wildlife Area (Jackson County), Trempealeau National Wildlife Refuge (Trempealeau County), and Nine Mile Island Savanna (Pepin County).